DEVELOPMENTS IN THE WORLD OF BRAILLE

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DEVELOPMENTS IN THE WORLD OF BRAILLE

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Lou Rives has asked me to talk with you today about new developments in the world of braille. To a large extent this world is static. For this reason, at least in part, a great deal of ferment exists in the world of recordings. Bob Bray has (will) bring you up to date on this.

Today I would like to review two areas of timely interest. The first topic concerns developments and potential for automation in braille production. The second concerns consumer demand and consumer behavior.

Automation in Braille Production

The present focal point in automation of braille production is computer translation of ink print to braille. Several systems for this purpose are in various stages of development throughout the world. However, for illustrative purposes I will use the system currently in use at the American Printing House since this was the pioneer system and is the only system currently in production at this time. The system was developed through a joint effort of APH and IBM. ([illegible])

Here is how it works. A sighted keypunch operator, using a special set of rules, punches ink print material, letter by letter, in a deck of cards. This deck is then verified by a second operator, who simply produces a second deck at the same time checking and correcting discrepancies with the first deck as they occur. The information on the corrected deck of cards is next fed into a computer which translates it into the coded form we know as braille. The translated material appears in the

form of a second deck of cards. This second deck is then fed into a regular IBM card reader which activates an automated stereotype machine. This, of course, is the device which produces the metal plates from which we print your braille books.

Why automate? The eventual hope is to reduce the cost of braille. As things presently stand, plate making costs represent two-thirds of the non-profit price of a braille book.

Under traditional systems for mass production of braille materials, operators, usually women, learn the braille code and then learn to operate the stereograph machines upon which the plates for embossing braille are made. Learning these two skills to a productive level often takes two years. Factors such as marriage, pregnancy, and movement of families result in high personnel turnover. Methods for production of braille plates are slow because of the nature of the equipment. For example, correction of an error in a braille plate requires that the operator pound out the erroneous braille dots with a hammer and correcting tool. An additional problem is that proofreading of such plates also requires skilled braillists.

Under the automated system, the personnel aspects of plate production are simplified. Keypunch operators can be drawn from the common employment market and the special training period for braille production is negligible. Since the decks of cards are verified for accuracy at the outset, proofreading costs are minimized.

The present system looks promising, however, if you will pardon a pun, there are still some jokers in the deck. These jokers are versatility and cost.

First, let's talk about versatility. As things presently stand, computer translation programs can only handle print material that is in prose form. Translation of material into the special braille codes required by mathematics, music and some science is not currently possible. However, an attack on these problems is underway. Supported by a research grant awarded by the U. S. Office of Education, APH is conducting a research program whose goals are extension of the translation program to handle these special codes, improvement of quality of translation, and exploration of more efficient methods for translation. To date considerable progress has been made toward writing a program for computer translation of the mathematics code and the overall quality of the literary translations has been significantly improved.

Well, what about costs? In the automated system the two principle costs are computer time and keypunch costs. At present, plate making costs using our automated system are equal to or slightly less than those for the traditional system. However, International Business Machines has given us a computer and donated maintenance for this equipment. If computer costs were included, plate making by conventional means would be far less expensive. However, the future is not bleak. Computer costs are being drastically reduced and computer capabilities are being enhanced. The point in the future does seem to be approaching when APH can justify the cost of a single computer to be used for both business purposes and braille translation.

With respect to keypunch cost, the horizon is also aglow

with promise. Two possibilities glimmer, one immediate and one remote. Let's consider first the immediate possibility. Many inkprint publishers are automating their typesetting through development of tape controlled linotypes or other similar devices. The tapes, of course, tell the linotype machine what to do and, therefore, replace the human operator as in the automated braille system. A number of groups have been interested in developing computer programs which would modify these tapes so that they might replace the keypunch imput into the braille system. One such program, developed at MIT, is now available. The possibilities of experimentally using this technique in concert with the automated braille system to publish material such as the weekly news summary of the New York Times are currently being discussed.

On the remote horizon is the possibility of using optical sensors to read print and provide the keypunch imput in the braille system. Developments in this area are still in their infancy, but have already made their impact in banking circles.

One other technological development is of interest. This is the high speed braille printer. These are under development by several groups, including Honeywell and IBM. High speed printers provide a means of making single copies of high quality braille. One sided printing only is possible. In their present stage of conceptualization they do not appear useful for mass production. However, they do provide hope for providing a means of production of single copies of material upon demand. Coupled with the systems previously discussed, high speed printers could do much to supply the short run market for braille composed of

students and others who require materials not of sufficient interest to warrant mass production.

Consumer Demand and Consumer Behavior

Perhaps it might be of interest first to see how the demand for braille has been reflected in the production records of APH over the last ~~two~~ Ten years. We will compare fiscal year 1956 with fiscal year 1966. In 1956, APH embossed 93,000 plates for printing braille and in 1966 the number of plates embossed was 156,000. This represents about a 65% increase in production. In 1956 forty million braille pages were printed as compared to fifty nine million in 1966. According to this index, productivity has increased by 50% over a ten year period. However, production figures in 1966 were down from a peak production of 159,000 plates in 1965 and down from sixty-eight million pages in 1964. At any rate, the market for braille appears to be expending.

What about the braille reading population? While we have no data for the adult population, we do have some that describe the elementary and secondary school population. Within the schools there appears to be an emphasis on increased use of residual vision. Between 1960 and 1966 the proportion of legally blind students identified as using braille dropped from 58% to 46%. This represents a reduction of 12% which is sizable. While no direct evidence is available, this reduction in the student braille reading population may be related to the braille production decrement exhibited in the last year or two.

Now about the behavior of braille readers. Reports are beginning to appear in the literature in which braille reading speeds

of 300-500 words per minute are reported. Our experience in studying the reading behavior of approximately 5000 school children leads us to believe that this "simply ain't so." We have never examined a reader who was able to sustain speeds of over 200 words per minute and average sustained reading speeds range from 80-90 words a minute.

These slow reading speeds are, of course, responsible for exploration of the usefulness of other than printed media for the blind. Recordings are the focal point now. Does predominate use of recordings in study lessen the need for braille skills? Not according to research we have conducted. Interviews with students relying on recorded texts revealed that successful students rarely listened to their recorded texts more than once. During this time, they reduced the content to braille notes and summaries and relied principally on these for additional study.

Recent research has given us a pretty clear idea of the perceptive behavior of the braille reader. The perceptual unit in braille reading appears to be the braille character. Most braille readers simply do not recognize words as wholes as their sighted counterparts do. Braille readers receive information sequentially as the reading finger moves from character to character. This information must be integrated to yield word recognition. However, many braille readers can recognize words before they touch all the characters the words contain. This implies that the braille reading process involves "one hell of a lot of" guessing. This is not random guessing, but highly intellectual guessing based on peripheral information acquired during the reading sequence.

The sources of these peripheral cues to word recognition are such things as the preceding content, sentence structure, knowledge of rules of grammar, word prefixes and the relative frequency of occurrence of individual letters and of letter combinations. It is believed that the observed slow reading speeds for braille are a consequence of the necessity to sequentially integrate the information contained in the characters. Consequently, faster braille reading speeds do not appear likely for material presented in page form.

In view of these facts, it appears that the future for braille may be as follows:

(a) Blind students and adults will continue to need high level braille reading and writing skills.

(b) Automated production techniques will provide the means of increasing the array of materials available to braille readers and of reducing their cost.

(c) Braille production will increase, or at least remain at its present levels.

(d) Because of slow reading speeds, other media (particularly recordings) will replace braille for many purposes. Many books and other publications will not occur in a pure braille or recorded form. Some books will appear in combined from in which appropriate parts are brailled and appropriate parts are recorded.